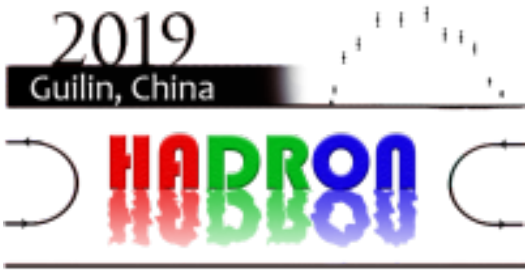

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The chiral phase transition temperature in (2+1)-flavor QCD

Sunday, 18 August 2019 17:00 (20 minutes)

The chiral phase transition temperature T_c^0 is a fundamental quantity of QCD. To determine this quantity we have performed simulations of (2 + 1)-flavor QCD using the Highly Improved Staggered Quarks (HISQ/tree) action on $N_\tau = 6, 8$ and 12 lattices with aspect ratios N_σ/N_τ ranging from 4 to 8.
In our simulations the strange quark mass is fixed to its physical value $m_s^{\rm phy}$, and the values of two degenerate light quark masses m_l are varied from $m_s^{\rm phy}/20$ to $m_s^{\rm phy}/160$ which correspond to a Goldstone pion mass m_π ranging from 160 MeV to 55 MeV in the continuum limit.
By investigating the light quark mass dependence and the volume dependence of various chiral observables, e.g. chiral susceptibilities and Binder cumulants, no evidence for a first order phase transition in our current quark mass window is found.
Two estimators T_{60} and T_δ are proposed to extract the chiral phase transition temperature T_c^0 in the chiral and continuum limit and our current estimate for T_c^0 is 132^{+3}_{-6} MeV.

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